A method for producing a solution having lubricating properties intended to be used as an additive to a liquid

The present invention refers to a method for producing a solution having lubrication properties intended to be used as an additive to a liquid preferably a liquid fuel or a lubricant and a solution made according to said method, which when blended gives the liquid friction-reducing, lubricating and corrosion ihibiting characteristics.

It is previously known, as example from US 5,431,830, that boron can establish a complex ligand bond to other metals. This occurs after an exposure over time, from hours to days. The boron compounds in question are aligned to two dimensional pallets, that slides on each other, which causes a reduced friction. Furthermore, boron acts as a corrosion ihibitor for metals as the boric acid bonds to a thin layer on the underlying metal surface and prevents oxidation due to the electro negativity, which makes boron an effective reduction substance that prevents corrosion of exposed surfaces.

According to previously known technique, oil is blended with a high concentration of boric acid, and the blend is diluted at a ratio of approximately 10% to different lubricating oils.

According to US 6,368,369, it's stated that boric acid can be used as an additive to fuels to accomplish a friction reducing effect. The method is to mix boric acid in a base oil or a concentrate based on a diesel fuel. The particle size of the boric compound , normally in the range of 0.5 to 20 micron, is made by "jet-milling", a method in doing so. Experiments have shown that an additive, diesel addi-

tive as example, made by this method over time has a limited stability. The boric acid particles are aggregating and are falling out and gathered on the bottom of the container. This happens within a period of months or less. This could lead to severe consequences for any engine, as example a diesel engine. Even when the boric acid particles are mixed in a base oil and thereafter eventually are diluted in fuel or the like, the same risk exists.

The object of the present invention is to eliminate the disadvantages as mentioned above, and to make an additive to a fluid or liquid, preferably a liquid fuel or a lubricant, which can be dissolved in the liquid and give the liquid friction reducing, lubricating and corrosion restraining effect. The characterizing features of the invention are stated in the following claims.

Thanks to the invention, a method for producing a solution having lubricating properties of the kind mentioned above, which in a distinguishing way fulfils its purpose and also an application of the mentioned solution as an additive to a liquid, such as fluid fuel or a lubricant to give the liquid friction reducing, lubricating and corrosion restraining characteristics. The invention means that a boric compound with lubricating characteristics exits in the form of a solution. The borat ions will at that consist of a homogenous phase together with the solvent, and which solution, under stable conditions at that may consist of a high concentration of borate, thanks to the used solvent, and preferably an alcohols hydrogen bonds, counteracts the elctro negativity of the boric compound and it's tendency to covalent bonds.

The invention is described further below by aid of some preferable embodiment examples.

The boric compounds, which according to an example, are dissolved according to the foregoing invention are preferably Boric BOH_3 or dibortrioxide B_2O_3 (boric oxide), which offers good friction reducing characteristics. The solvent can consist of water and/or an alcohol, individually or blended to a mixture. The solvent should also be a liquid hydrogen. The most alcohols should be used, as example ethanol, methanol etc. and the solution is made by shaking boric acid or bortrioxide together with alcohol or water, eventuially also by adding small mechanical elements to further increase the mechanical work.

In the solution, the boric compound may be in a concentration of up to 250,000 ppm or more if necessary. When blended to fuel such as diesel or gasoline, the fuel mixture should consist of a concentration of boric compound in the range of 10 to 1,000 ppm, preferably in the range of 100 to 200 ppm.

When the solution is added to a lubricant, the composition consisting lubricant and the solution should have a concentration of boric compounds of around 400 ppm/4%.

In another application, the solution is used as an additive, which is added in a proportion to a lubricant, hydro carbon fuel or a bio fuel such as the boric compound is bonded on surfaces exposed by friction at which the friction is reduced. The solution allows for an optimal dissolvement in the fluid and thereby the mentioned advan-

tages of a stable solution which is friction reducing, lubricating and corrosion inhibiting. The fluid may be as example hydro carbon fuels such as diesel or gasoline or other and the solution may also be injected separately in an combustion machine such as an hydrogen engine or other engine where friction reduction and corrosion inhibiting is needed. When mixing a boric acid solution with hydrogen, a thermic reaction is achieved, which further increases the tendency to covalent bond.

The invention also incorporates a solution as such made as an additive by dissolving a boric compound, a boric acid and/or bortrioxide.